

Mapping policy guidance for an ecosystem service approach to shoreline protection via a geospatial shoreline management model

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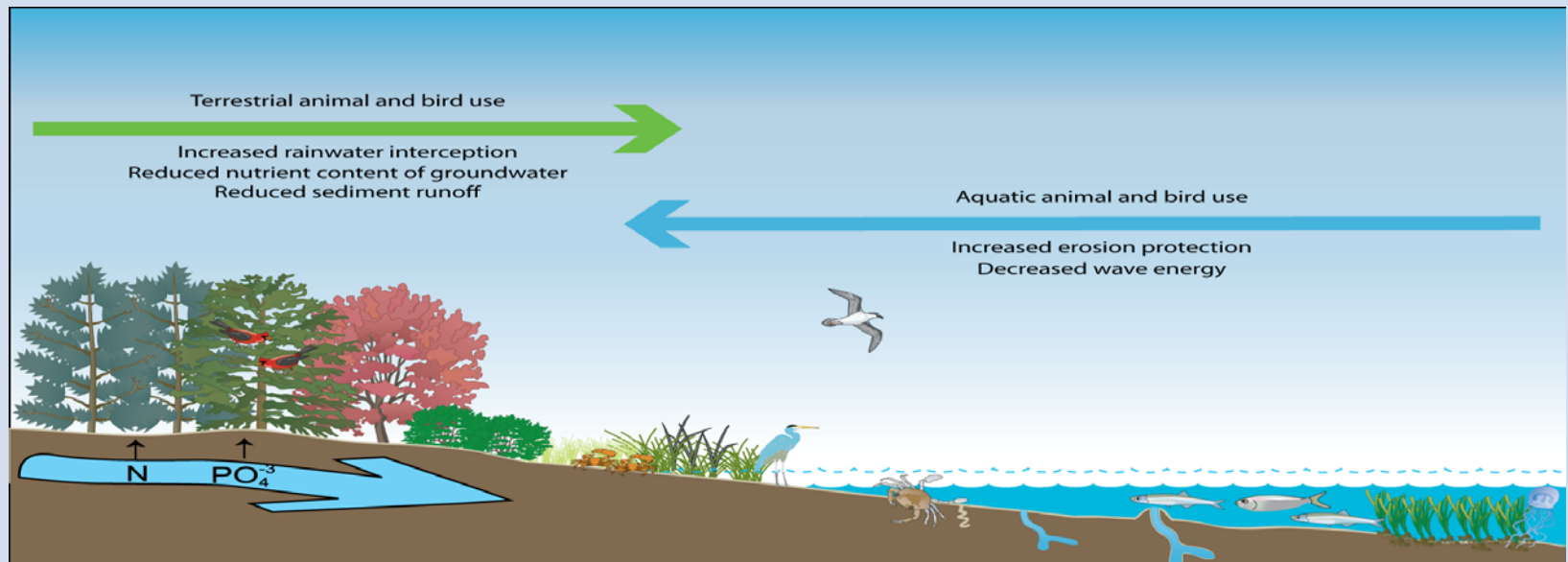
Our Role

- Provide policy guidance to state policy-makers on tidal shoreline management;
- Provide science-based advice to state and local coastal managers who regulate activities on tidal shoreline through the permit process
 - Advice we provide is not static
 - Evolves as the science develops and lessons are learned



What is an ecosystem service approach to shoreline protection?

Erosion control options that do not sever natural processes between upland and aquatic areas



Maintain Cross-shore connections

Symbols courtesy of the Integration and Application Network (ian.umces.edu/symbols/), University of Maryland Center for Environmental Science.

Traditional Approaches ...

Bulkhead



Revetment



**...sever the natural connection
between upland and wetland**

Cumulative Impacts of Shoreline Hardening

- Forest suppression & fragmentation
- Tidal wetland loss
- Sediment supply & transport altered
- Aquatic habitat decline
- Decrease fish biomass and diversity
- Reduced long term sustainability



Preferred Approach: “Living Shoreline”



Living Shorelines Benefits

- Abate erosion
- Improve marine habitat & spawning areas
- Improve riparian habitat
- Create or maintain cross-shore connections
- Affordable construction costs
- Net wetland gain
- Managed habitat retreat



The Challenge

- Change the way people do business
- Build confidence in new approaches
- Gain legislative support



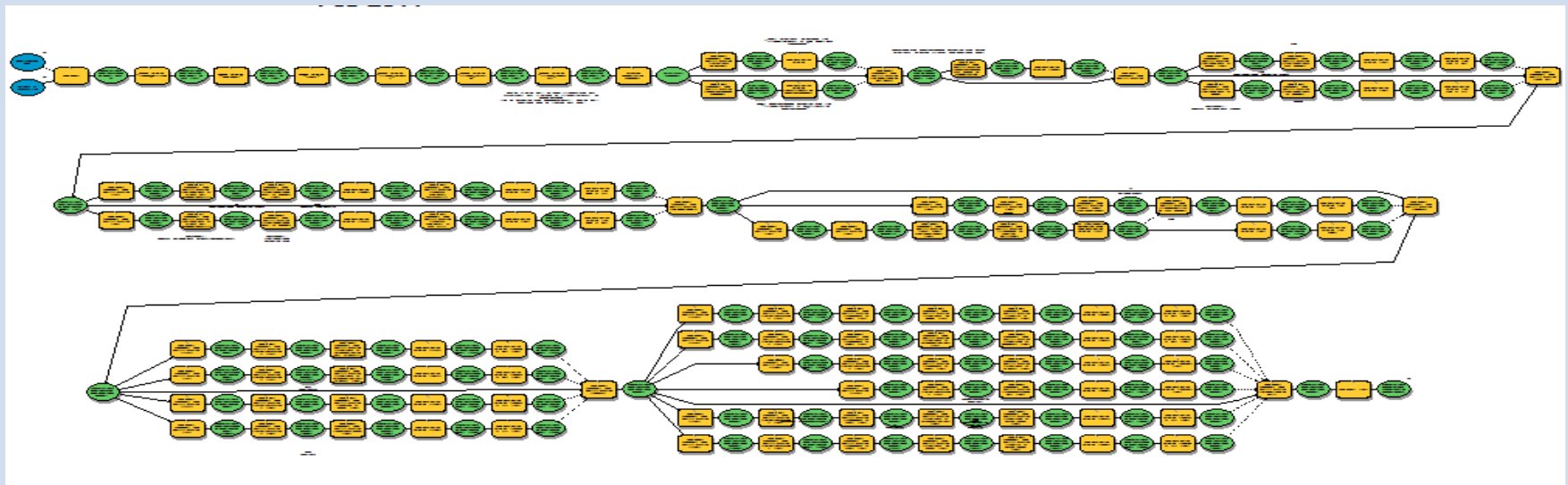
Meeting the Challenge

- Outreach: regulators, policy makers, marine contractors, and property owners
- Policy Guidance: policy to reflect a preference for living shoreline
- Implementation: tools

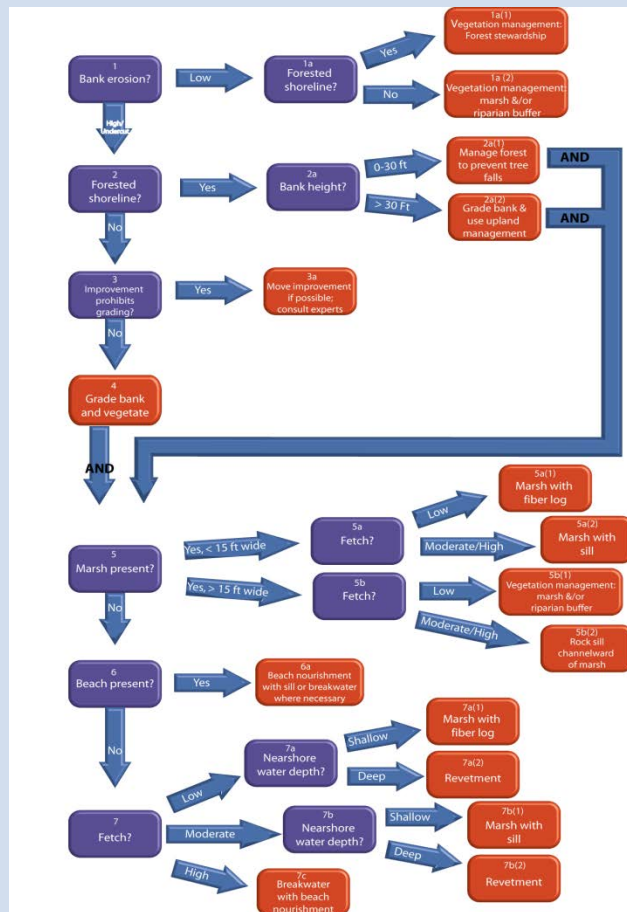


Shoreline Management Model

- Geo-spatial logic model that returns the **preferred** approach for erosion control;
- Using **available** geo-spatial data;
- ArcGIS Model Builder

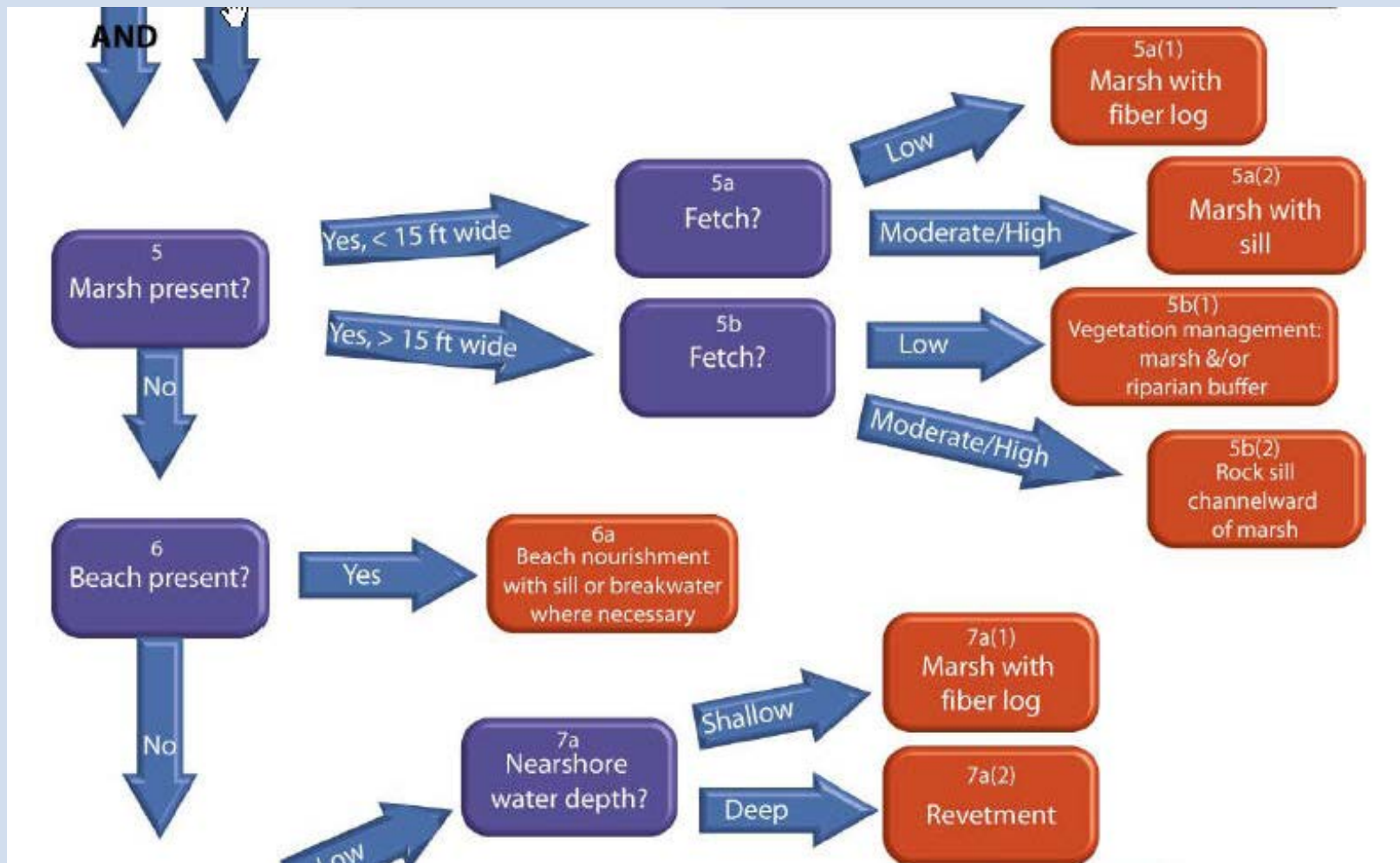


Based upon an ICZM Decision Tree



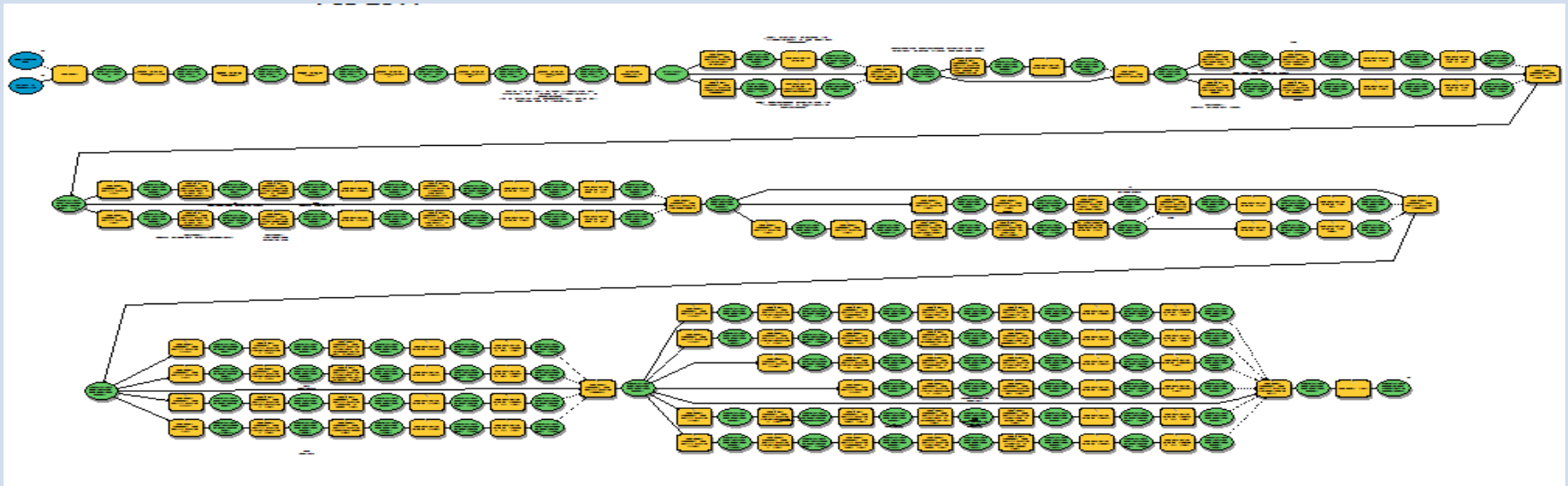
- the **decision tree** provides the decision support behind the geo-spatial logic model;
- developed to improve the decision making capacity of **shoreline managers**;
- pathways are determined by the user response to questions regarding specific **shoreline characteristics**

Decision Tree Logic Model

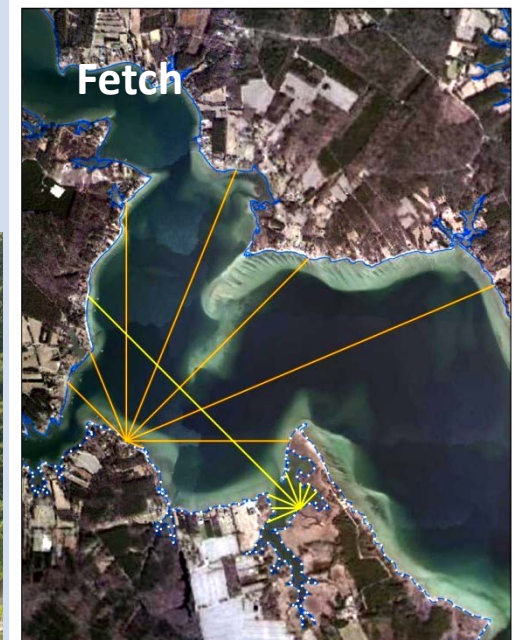
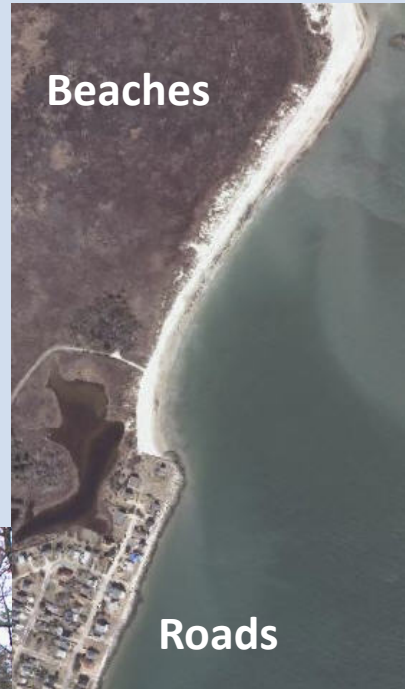


Shoreline Management Model















Collect and manipulate geo-spatial data from a variety of databases to reflect the parameters and their thresholds found in the decision tree



Data inputs

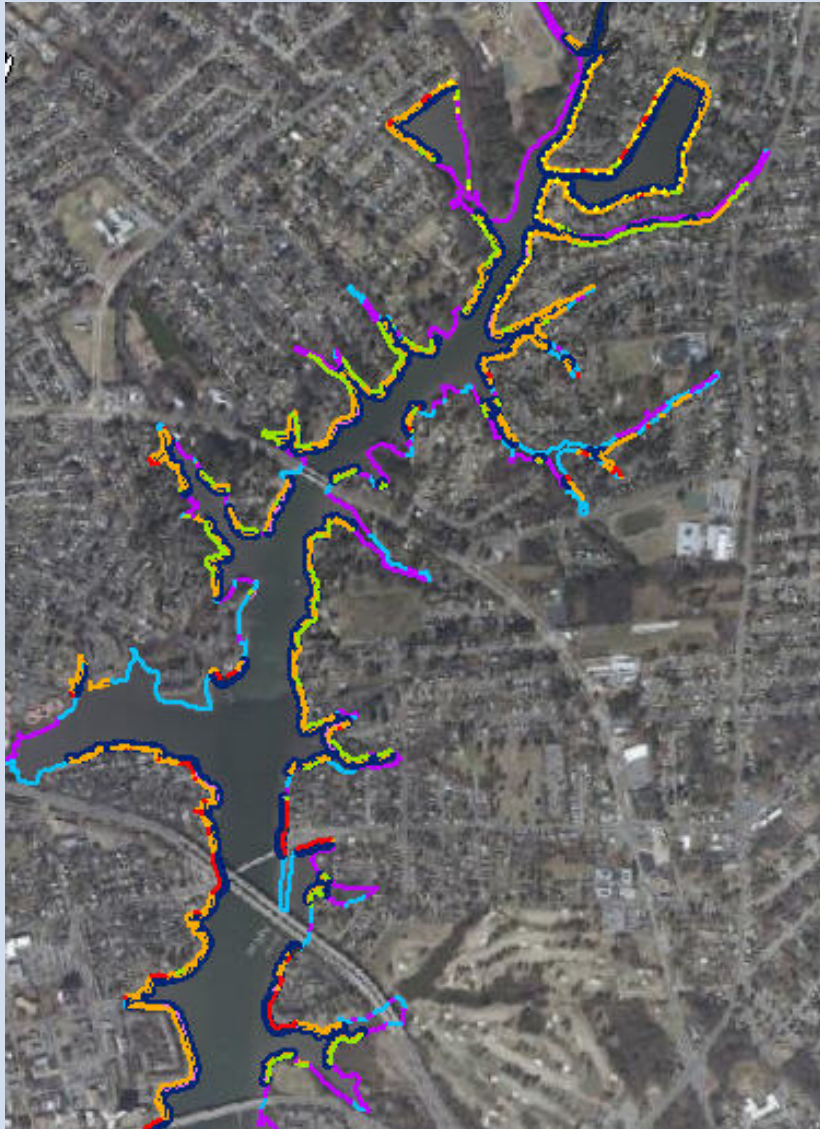


Model Output: Recommended Actions

-  No action needed
-  Vegetation management: Forest stewardship
-  Vegetation management: Marsh and/or riparian buffer
-  Manage forest to prevent tree falls
-  Grade bank and vegetate
-  Plant marsh with fiber log
-  Rock sill channelward of Marsh
-  Plant marsh with sill
-  Beach nourishment with sill or breakwater where necessary
-  Breakwater with Beach nourishment
-  Revetment
-  Areas of special concern
-  Move improvement if possible; consult experts
-  Currently defended

**Living
Shoreline
Projects**

Shoreline Management Model Output – Hampton River



Legend

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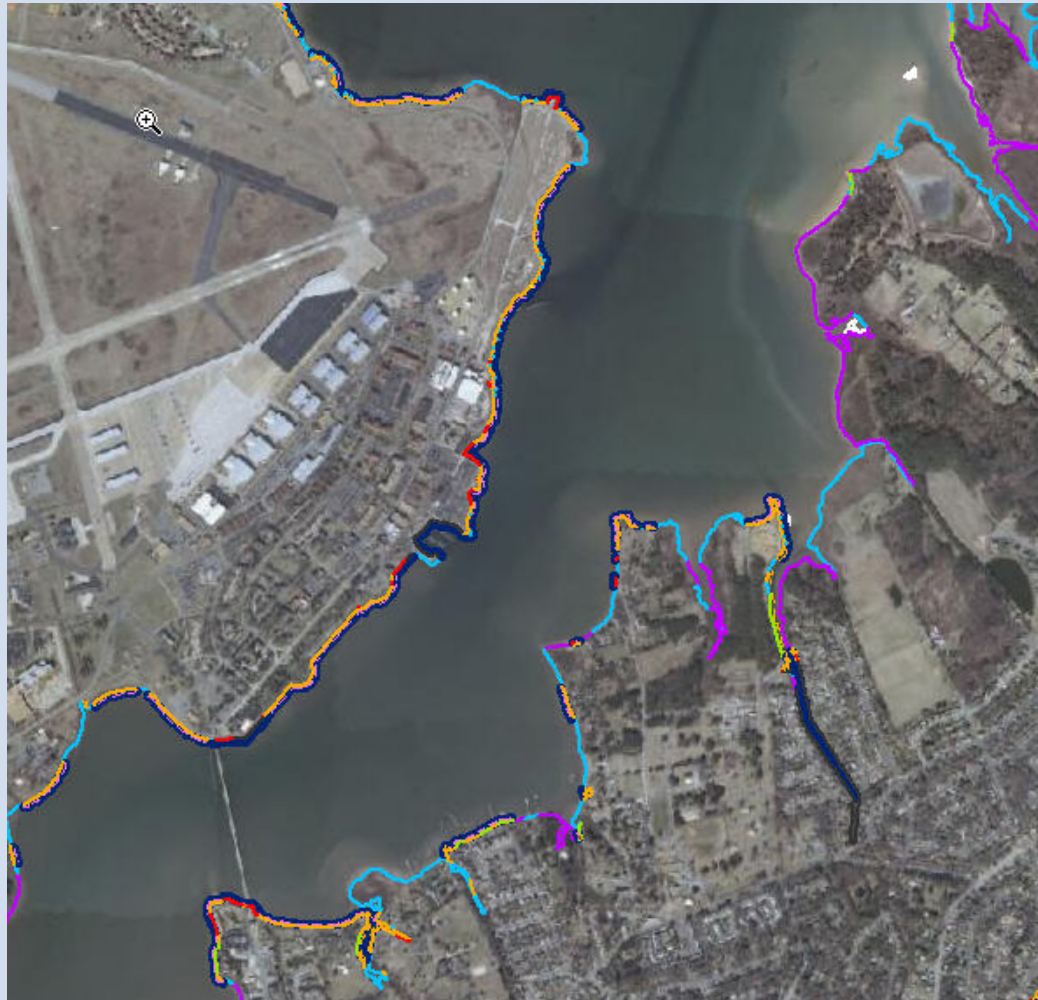
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Next Steps

- Refine the model to address special cases;
- Expand the model geographically;
- Output formats;
- Provide training

